**Lab Report**

**Object-Oriented Programming: Basketball Game Simulation**

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**Objective:**

The primary objective of this lab is to gain understanding of classes in programming, focusing on how to access and manipulate their attributes and member functions. The task involved creating a basketball game simulation, providing a practical application of these concepts in a dynamic and interactive setting.

The concepts explored in this lab, particularly the use of classes and their attributes and member functions, are foundational to the field of Computer Science (CS) and Engineering for reasons like- Team Collaboration, Object-Oriented Programming (OOP) Paradigm, Problem-Solving Skills.

**Task 1:**

The main task was to construct a basketball game simulation by developing a class for basketball players. The class was designed to encapsulate the following attributes:

* **Name**: Identifier for each player.
* **ShotsTaken**: Counter for the number of shots attempted.
* **ShotsMade**: Number of successful shots.
* **PassesAttempted**: Number of passes attempted.
* **PassesMade**: Number of successful passes.

Along with these attributes, the class included two key member functions:

* **PassBall**: This function returns a boolean value indicating whether a pass was successful or resulted in a turnover. The function increments **PassesAttempted** and **PassesMade** and utilizes a random number to determine the success of the pass based on a calculated passing percentage.
* **TakeShot**: This function returns the number of points scored, taking the shot's value (1, 2, or 3 points) as a parameter. It determines the success of the shot based on a shooting percentage, incrementing **ShotsTaken** and **ShotsMade**.

The main function of the program included an array of 5 players, initialized with predefined names. The game simulation consisted of 30 possessions, where the player with the ball was chosen randomly, and various actions like shooting, passing, or checking stats could be performed.

A screenshot of a computer

Description automatically generated

**Challenges:**

One challenge faced during development was ensuring a realistic and balanced game experience. This was achieved by trying all the probabilities in the **PassBall** and **TakeShot** functions and extensively testing the game to achieve a balanced and enjoyable gameplay experience.

**Public and Private Functions:**

The **BasketballPlayer** class consisted of public functions, **PassBall** and **TakeShot**, designed to modify the object's state based on game events. These functions were crucial in simulating the dynamic nature of a basketball game.

The main function controlled the game's flow, handling the selection of players for each possession and processing the user's choices. This included the logic for the opponent's actions, ensuring that the game was not only interactive but also provided a sense of competition.

**Conclusion:**

This lab helped us in understanding the practical applications of classes and object-oriented programming. It underscored the importance of these concepts in structuring complex programs and simulating real-world scenarios in a controlled environment. This experience lays the foundation for more complex programming tasks in computer science and engineering, where object-oriented design is paramount. The lab not only enhanced our technical skills but also provided a deeper appreciation for the intricacies of game development and the importance of probability and randomness in creating engaging simulations. It's a testament to how computer science can be both challenging and rewarding.